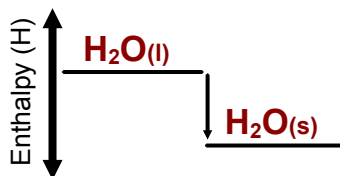


Questions 1, 2, 4, 18, 19, 33, 34

- 1) The metal feels colder than the plastic because metals are good conductors of heat. You lose heat to both, but lose it much faster to the metal.
- 2) Liquid water is lower in energy, so it is more stable than H_2 and O_2 . Hydrogen will combust in oxygen to produce water vapor and release a lot of energy in the process.
- 4) Liquid water turning into ice is exothermic. The potential energy stored in the water system is converted to kinetic energy which is released as heat into the surroundings.



18) $KE = \frac{1}{2} mv^2 = 0.5 (1.0 \times 10^{-8} \text{ kg}) (2.0 \times 10^3 \text{ m/s})^2 = 0.020 \text{ J}$

- 19) The second object has half the mass, but double the velocity. Since kinetic energy is proportional to velocity squared, the second object will have twice as much kinetic energy.
- 33) a. The solution gets colder because the reaction is absorbing heat from the surroundings. **Endothermic**
 - b. All combustion reactions release heat to the surroundings. **Exothermic**
 - c. Dissolution of H_2SO_4 releases heat to the surroundings. **Exothermic**
 - d. Water needs to absorb energy in order to boil. **Endothermic**
- 34) a. All combustion reactions are exothermic.
 - b. Condensation is a decrease in phase. Energy is released. **Exothermic**
 - c. CO_2 is undergoing sublimation. Increase in phase. **Endothermic**
 - d. Energy has to be absorbed to break a bond. **Endothermic**